

Case Report

Impacted Broncholiths Removed With the Holmium:YAG Laser

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Background and Objective: Although the Nd:YAG laser has been used endoscopically to remove broncholiths, our experience with it for this purpose has been tedious and difficult. The calculus burns and partially vaporizes, but most of the removal has to be done mechanically with crushing from biopsy forceps.

Laser lithotripsy for ureteral calculi has been reported using the pulsed Holmium:YAG laser to fragment the calculus, and we evaluated the efficacy of this laser to remove impacted broncholiths.

Study Design/Materials and Methods: Two patients with impacted broncholiths obstructing segments of the right middle lobe were treated using a pulsed Holmium:YAG laser. General endotracheal anesthesia with an FIO₂ of 40% was used, and the laser energy was delivered through a 365- μ m bare tip fiber passed through the biopsy channel of a flexible bronchoscope inserted through the endotracheal tube.

Results: The calculi were easily fragmented and removed with suction.

Conclusion: The pulsed Holmium:YAG laser was an effective tool to fragment and remove impacted broncholiths with minimal side effects using 2 J and 5 Hertz. The calculi exploded into tiny fragments. © 1996 Wiley-Liss, Inc.

Key words: broncholiths, Holmium:YAG laser, middle lobe syndrome

INTRODUCTION

Although the Nd:YAG laser has been used endoscopically to remove broncholiths [1,2] our ex-

perience with it for this purpose has been tedious and difficult. The calculus burns and partially vaporizes, but most of the removal has to be done mechanically with crushing from biopsy forceps.

Laser lithotripsy for ureteral calculi has been reported using the pulsed Holmium:YAG laser to fragment the calculus [3–5]. This laser has a wavelength of 2.1 μ m and can be passed through flexible fibers that easily pass through endoscopic biopsy channels.

We recently treated two patients with pneumonia and atelectasis from broncholiths obstructing segments of the right middle lobe. The broncholiths were impacted, and previous efforts to mechanically crush and remove them were unsuccessful. The calculi were easily fragmented and removed using a pulsed Holmium:YAG laser (Verapulse, Coherent, Palo Alto, CA). General endotracheal anesthesia with an FIO₂ of 40% was used, and the laser energy was delivered through a 365- μ m bare tip fiber (Coherent Versatome Slimline II) passed through the biopsy channel of a flexible bronchoscope inserted through the endotracheal tube. All biopsies and washings for cytology were benign.

CASE REPORTS

The first patient was a 75-year-old white female with obstruction of the lateral segment of the right middle lobe. Holding the bare fiber tip in contact with the calculus, we began lasing with 0.5 J and 5 pulses per second, but this had little effect on the calculus. Serially increasing the power, we found 2.0 J at 5 Hertz (total of 550 J) immediately fragmented the calculus, and the pieces were easily aspirated through the fiberoptic bronchoscope with irrigation. A repeat bronchoscopy the next day showed the bronchus completely open (Fig. 1).

The second patient was an 80-year-old white male who also had an impacted broncholith of the lateral segment of the right middle lobe with atelectasis and pneumonia. He was treated as an outpatient using the same anesthesia and delivery techniques using 2.0 J and 5 Hertz (total of 470 J). The stone immediately fragmented, and, along with the fragments, pus was aspirated from

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Fig. 1. Broncholith obstructing the lateral segment of the right middle lobe and its clearing after Holmium:YAG laser fragmentation.

Fig. 2. Broncholith obstructing the lateral segment of the right middle lobe and its clearing after Holmium:YAG laser fragmentation.

the distal segments of the previously obstructed segment. The entire procedure took 22 minutes (Fig. 2).

Both patients were discharged with oral antibiotics and have had complete clearing of their pneumonitis and atelectasis.

DISCUSSION

The pulsed Holmium:YAG laser was an effective tool to fragment and remove impacted broncholiths with minimal side effects using 2 J and 5 Hertz. The calculi explode into tiny fragments. The procedure was much easier than our experience with the Nd:YAG laser for this purpose.

We have performed over 800 endobronchial tumor laser resections using general anesthesia by passing the fiber through the fiberoptic endoscope which was inserted through a standard endotracheal tube. We maintain the FIO_2 below 40%, and, by carefully avoiding lasing the endobronchial tube and endoscope, we have never had any problems with ignition.

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